

## Does dissection method affect complications in endoscopic hernia surgery?

The effect of the dissection method on complications

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### Abstract

**Aim:** In this study, we aimed to explain how to achieve an accurate and comfortable dissection area in totally extraperitoneal (TEP) inguinal hernia repair to avoid unwanted complications and compare complications according to the dissection techniques in TEP repair.

**Material and Methods:** Sixty-three patients between June 2018 December 2019 included in the study were operated with the TEP technic in a tertiary university hospital. Patients were divided into two groups. In Group 1, blunt dissection was performed using a camera in 32 patients and in Group 2, precise dissection was performed on 31 patients using working instruments. Demographic data (age, gender, body mass index (BMI)), American Society of Anesthesiologists (ASA) score, operative time, intraoperative, and postoperative incidents (vascular, nerve, or ductus deferens injury, peritoneal tear, conversion to open surgery) were compared between the two dissection methods.

**Results:** We observed significant differences in terms of intraoperative incidents, overall operative time, and postoperative seroma formation.

**Discussion:** Complications due to TEP hernia repair can be decreased and easily managed with the modification of the dissection method. For a better view and shortening the operation, time precise dissection with working instruments can be chosen as an alternative for balloon and camera dissection.

### Keywords

Inguinal hernia; Endoscopic surgery; Complication; Dissection

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## Introduction

An inguinal hernia is one of the most commonly diagnosed surgical pathology [1,2]. Numerous techniques for the repairing an inguinal hernia have been described. Open and laparoscopic techniques are the subject of discussion for the repair. Endoscopic instruments can easily be used for all kinds of abdominal hernias, whether inguinal, incisional, or suprapubic [3–5]. The European Hernia Society has recommended TEP for endoscopic inguinal hernia operations [6]. Endoscopic inguinal repair has many advantages such as less postoperative pain, shorter hospital stay, and earlier return to work, better cosmetic results relative to an open technique. The long learning curve and still requirement for general anesthesia are limitations for laparoscopic repair [7].

The primary aim of this study is to explain how to achieve accurate and comfortable dissection area in TEP inguinal hernia repair to avoid unwanted complications. As a secondary objective, to compare the complications according to dissection techniques in TEP inguinal hernia repair.

## Material and Methods

All patients operated with the TEP technic between June 2018 and December 2019 were included in the study. Sixty-three patients with the diagnosis of inguinal hernia were operated in a tertiary center by the same surgeon who is specialized and completed his learning curve in TEP hernia repair. In our very first cases, we have some problems like achieving the right working place, and some unwanted incidents such as bleeding of small vessels, peritoneal tears, pneumoperitoneum were observed. The common feature of all previous surgeries was camera dissection, and this method made it difficult to perform the surgery due to the above-mentioned intraoperative events. Following this modification of the surgical method, this study was started. Patients were divided into two groups. Thirty-two patients constituted Group 1, in which the operation was started with a blunt dissection with a camera, and 31 patients constituted Group 2, in which the operation was started with precise dissection. Patients who had a scrotal hernia, history of previous surgery in the inguinal region, recurrent, irreducible hernia, those who did not accept laparoscopy, and the ones who were not candidates for general anesthesia were excluded from the study. The demographic data (age, gender body mass index (BMI)), American Society of Anesthesiologists (ASA) score, operative time, intraoperative, and postoperative incidents (vascular, nerve, or ductus deferens injury, peritoneal tear, conversion to open surgery) were recorded on a pre-prepared form. The postoperative hospital stay was also noted. All the data were entered into a computerized database. The study was approved by the University of Health Sciences, Antalya Education and Research Hospital Ethical Committee. Patients were informed in detail and signed informed consent before the surgery.

### Statistical analysis

An Excel worksheet (Microsoft Corp, Redmond, WA) was prepared to enter the data; the statistical analysis was carried out using JMP Statistics (NC 27513-2414, USA). Descriptive statistical methods (mean, standard deviation, frequency, percent, minimum, and maximum) were used to evaluate the

study data. Independent samples t-test and the Mann-Whitney U test were used to compare the quantitative variables of groups. P-value <0.05 accepted as statistically significant.

### Surgical technique

Conventionally, TEP is performed under general anesthesia, and three trocars that positioned below the umbilicus were used. The first one is for a camera trocar with a diameter of 10 mm incision. It is placed between the layers of the rectus abdominus muscle. The remaining trocars were used for working; the first one was positioned 5 cm below the camera trocar, and the second one was also positioned 5 cm below the second one under direct vision. Although the preperitoneal area is rigorous, some precise dissection is needed at the beginning of the procedure for appropriate hernia repair. Balloon trocars are less popular nowadays due to its cost and some unwanted complications. Usually, a 10 mm camera is used for this very first dissection to create a space under the rectus muscles, space of Retzius, and even to achieve space of Bogros in a semi-blind manner. During these maneuvers, some unwanted complications may occur, including injury of the inferior epigastric vessels, peritoneal tear, and pneumoperitoneum. These complications make the surgery less comfortable, and a conversion to transabdominal repair or open surgery can be seen.

In our precise dissection method, after the camera trocar placement, we insufflate the preperitoneal area with CO<sub>2</sub> gas at 12-14 mmHg. No more movement, no more additional blunt dissections should be done with the camera to avoid hemorrhage or pneumoperitoneum at a very early stage of operation. We detect the first working 5mm trocar place with the help of a needle through the skin (Figure 1). Then we create enough space with the first working instrument for the second working trocar before doing a new excessive dissection. The second working trocar was placed approximately 5 cm inferior to the second trocar (Figure 2). Once all three trocars have been placed under direct vision and complete safety, we started to make dissection and making adequate space for appropriate repair. The working instruments should be used with an angle of 180 to each other. We can use whether sharp or blunt dissection (Figure 3). First of all, symphysis pubis can be quickly revealed. After that, lateral dissection must be started just beneath the epigastric vessels. There is an anatomical point known as "PK band" lateral to the epigastric vessels. PK Band should be passed with a precise blunt or sharp dissection under direct vision to avoid peritoneal tear. We must pass carefully lateral to this band to achieve the space of Bogros and make adequate space for mesh placement. For the remaining part of the repair, the triangle of doom, the triangle of pain, and the femoral triangle should also be revealed and be sure not to fix any tackers to these areas. The term 'inverted Y' is beneficial to ensure adequate dissection and repair [8,9].

## Results

Sixty-three patients were included in the study; there were fifty-eight males and five females. The median age was 48 years for males 32 years for females (22-77 years in both sexes), and 58,7% had an ASA I score. Thirty-one direct 21 indirect herniae and 11 bilateral herniae were operated. Table 1 shows the other demographic data of the patients. All patients were operated

**Table 1.** Demographic data and clinical characteristics

	Group 1 (n=32)	Group 2 (n=31)	P
Age	46.9 ± 2.5 (22-77)	49.5 ± 2.2 (24-65)	0,4
Gender			
Male	29 (91%)	29(94%)	0,67
Female	3(9%)	2(5%)	
BMI	25.2 ± 0.6 (18.4-31.3)	25.4 ± 0.5 (20.2-31.8)	0,83
BMI class			
Obese	2	2	0,57
Over-weight	13	13	
normal-weight	15	16	
under-weight	2	0	
Side			
Right	16	14	0,44
Left	9	13	
Bilateral	7	4	
Type of hernia			
Unilateral	25(78%)	27(87%)	0,28
Direct	13	18	
Indirect	12	9	
Bilateral	7 (22%)	4(13%)	0,66
Direct+Direct	4	2	
Indirect+Direct	3	2	
Presence of Comorbidity			
Diabetes	1	2	0,72
Hypertension	7	5	
COPD	3	3	
BPH	4	4	
ASA			
1	21	16	0,48
2	8	12	
3	3	3	

\*Continuous values are presented as Mean ±Standard error of the mean

**Table 2.** Comparison of two operative technics

	Group 1 (n=32)	Group 2 (n=31)	p
Operative time	63.9 ± 3.2 (40-100)	48.4 ± (35-80)	<0.001
Intraoperative Incidents	8 (25%)	2 (6%)	0,04
Peritoneal tear	7	1	0,03
Hemorrhage	5	1	0,09
Conversion to open surgery	3	0	0,08
Postoperative complications	6 (19%)	0	0,01
Surgical site infection	0	0	1
Seroma	4	0	0,04
Hematoma	1	0	0,32
Glob vesicalis	1	0	0,32

\*Continuous values are presented as Mean ±Standart error of Mean

with the TEP technique. The mean operation time was 56,27 minutes (35-100 minutes). Thirty-two patients were in Group 1, and thirty-one were in Group 2.

Overall, there were eight peritoneal tear, six vascular injuries that were controlled with energy device, and three cases of conversion to open surgery because of the pneumoperitoneum



**Figure 1.** Detection of first working trocar place



**Figure 2.** Detection of second working trocar place



**Figure 3.** Dissection with both instruments

and lousy vision due to bleeding. Table 2 shows the comparison of the two groups in terms of intraoperative incidents, overall operative time, and postoperative complications. No organ injury such as the bladder and bowel was seen. All meshes were fixed with an absorbable tackler. Postoperatively, in four patients, seroma was observed, one patient had urinary retention, and one had a hematoma. No other complications, such as pulmonary and wound infections, occurred.

## Discussion

Hemorrhage and pneumoperitoneum are the major complications seen in TEP hernia repair [10]. Intraoperative complications related to TEP surgery varies between 0,4 to 1,9% [11,12]. This makes the surgery more complicated, and some other strategies must be done, including conversion to transabdominal or to open repair. Balloon trocars were invented to create space and to make surgery easy, but due to their cost and some severe reported complications like bladder injury, they are less popular now [13]. Balloon trocars also yield an extra cost to patients or health insurance; this is another reason why surgeons left balloon trocar usage. These complications and costs have made camera dissection famous. As a result of the fact that most surgeons perform blunt dissection with cameras, injury of some small branches of the epigastric vessels, bleeding in the pubic symphysis area, and peritoneal rupture resulting in pneumoperitoneum can be observed.

Camera dissection is performed in a semi-blind manner at the earliest stage of the surgery, which results in these unwanted intraoperative incidents. Inferior epigastric vessel injury occurred in 0.4% of patients during trocar insertion [14]. In our very first cases, we have observed five vascular injuries in Group 1; three of them were injuries to the branch of the epigastric artery; the remaining two were hemorrhage in the symphysis pubis area. These vascular injuries were not severe and were controlled with simple electrocautery instruments, but these incidents decreased the quality of vision, affected the motivation of surgeon, and added extra time to the overall surgical period to control these bleedings.

Peritoneal tear is also one of the most commonly observed complications of TEP hernia repair [15]. An anatomical structure called the “PK band” located lateral to the epigastric vessels is one of the potential peritoneal injury areas [16]. Blunt movement of the camera or the instrumentation of working trocars can yield tears in the peritoneum. Pneumoperitoneum narrows the working area and complicates the surgery. To prevent this, a Veress needle can be inserted into the peritoneal cavity or the opening in the peritoneum can be closed with 5mm clips [17]. We have observed 7 peritoneal tears in Group 1, and one tear was observed in Group 2 at the beginning of the operation. We have managed one of them with Verres needle insertion, but we have converted to transabdominal surgery in two cases and open surgery in one case in Group 1. There was no need for conversion to a transabdominal or open approach in Group 2. To minimize these intraoperative incidents such as bleeding, pneumoperitoneum, and consequent change of the surgical method, blind camera dissection should be avoided and the first 5 mm working trocar should be placed under direct and safe view. After placing the first working trocar, the second 5 mm trocar should be placed through the sufficient gap created with this trocar.

Furthermore, all these intraoperative incidents have prolonged the time required for the surgery. Overall operation time from skin to skin incision was 55 minutes in Group 1, and 43 minutes in Group 2. Postoperative hematoma and seroma formation affect the quality of life of patients. In the literature, seroma formation was reported in 3.4% of patients, and hematoma formation was reported in 1.2% of patients who have

performed TEP surgery [18,19]. In our series, we have observed seroma in four patients (6.6%), and hematoma in one patient (1,6%) in Group 1, and any seroma or hematoma were recorded in Group 2.

## Conclusion

Complications due to TEP hernia repair can be decreased and easily managed with the modification of the dissection method. For fewer intraoperative incidents, better intraoperative view, and less operative time, the precise dissection method can be chosen as an alternative for balloon and camera dissection.

## Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

## Animal and human rights statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

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## Conflict of interest

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